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Dr. Middleton PHYS 132 HW
2-8-17 Ch. 28

ch.28 Conceptual: 7
Problems: 20, 22, 34

Conceptual

28.C.7

a.) The charge does not change due to the charges not being altered or discharged.

b.) $E = \frac{Q}{A\epsilon_0}$, the electric field is not dependent on seperation distance So therefore it does not change.

C.) It is increased by whatever factor the distance is multiplied to ensure conservation of charge

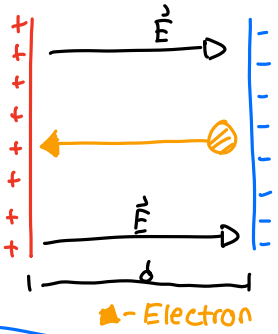
$$E_{cap} = \frac{\eta}{\epsilon_0} = \frac{Q}{A\epsilon_0}$$

$$V = ES \qquad \nabla V = \frac{QS}{A\epsilon_0}$$

$$V = ES \quad (\downarrow \uparrow) \qquad \frac{\eta}{\epsilon_0} = E \qquad \frac{Q}{A\epsilon_0} = E$$

Problems

28.P.20



A.) $\Delta V = 1000\ v$

B.) $V_0 = 6.99 \times 10^6\ m/s$

$d = 0.002m$
$r = 1.0 \times 10^{-2} m$

$F = qE$
$F = ma$

$q = 1.60 \times 10^{-19} C$
$m = 9.11 \times 10^{-31} Kg$
$E = 5.0 \times 10^5\ V/m$

$V_1 = V_0 + a\Delta t$
$X_1 = x_0 + V_0\Delta t + \frac{1}{2}a\Delta t^2$
$V_1^2 = V_0^2 + 2a\Delta x$

$\Delta V = ES \qquad E = 5.0 \times 10^5\ V/m$

$\Delta V = (5.0 \times 10^5\ V/m)(0.002m)$
$\Delta V = 1000\ V$

$qE = ma$

$a = \frac{qE}{m}$

$a = \frac{1.60 \times 10^{-19} C\ (5.0 \times 10^5\ V/m)}{9.11 \times 10^{-31} Kg}$

$a = 8.78 \times 10^{16}\ m/s^2$

$V_1^2 = V_0^2 + 2ax$
$V_1^2 - 2a\Delta x = V_0^2$

$V_0 = \sqrt{V_1^2 - 2a\Delta x}$

$V_0 = 6.99 \times 10^6\ m/s$

28.P.22

$e = 2.0 \times 10^9$
$q = -1.60 \times 10^{-19} C$
$K = 9.0 \times 10^9 \frac{Nm^2}{C^2}$
$r = 0.5 \times 10^{-3} m$

$Q = 2.0 \times 10^9 (-1.60 \times 10^{-19} C)$
$Q = -3.2 \times 10^{-10} C$

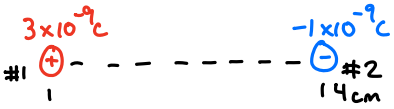
$V = \frac{KQ}{r}$

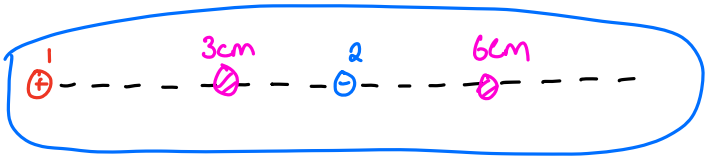
$V = \frac{9.0 \times 10^9 \frac{Nm^2}{C^2} (-3.2 \times 10^{-10} C)}{0.5 \times 10^{-3} m}$

$V = -5760\ V$

$V = -5760\ V$

28.P.34





$V_1 = \frac{Kq_1}{r_1}$ $V_2 = \frac{Kq_2}{r}$ $\frac{Kq_1}{r_1} = \frac{Kq_2}{r_2}$

$\frac{3.0\times10^{-9}C}{r_1} = \frac{+1.0\times10^{-9}C}{r_2}$

$V_1 - V_2 = 0$

$V_1 = V_2$

$\frac{r_2}{r_1} = \frac{+1.0\times10^{-9}C}{3.0\times10^{-9}C}$

$\frac{r_2}{r_1} = \frac{1}{3}$

$3r_2 = r_1$

3cm